

# SEQUENCE LISTING

<110> ffrench-Constant, Richard  
Bowen, David  
Rocheleau, Thomas  
Waterfield, Nicholas

<120> DNA SEQUENCES FROM PHOTORHABDUS LUMINESCENS

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<150> US 60/191806

<151> 2000-03-24

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<170> PatentIn version 3.0

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Gln	Lys	Glu	Ile	Thr	Lys	Gln	Thr	Gly	Asn	Ser	Lys	Asp	Gly	Tyr
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Gln	Thr	Glu	Thr	Asp	Tyr	Arg	Tyr	Glu	Leu	Lys	Leu	Ala	His	Ile
1190						1195					1200			
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Lys	Lys	Ile	Ser	Glu	Leu	Lys	Leu	Glu	Lys	Asn	Arg	Ala	Pro	Gly
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Leu	Tyr	Cys	Ala	Gly	Tyr	Gln	Gly	Glu	Asp	Thr	Leu	Leu	Val	Met
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Phe	Tyr	Asn	Gln	Gln	Asp	Thr	Leu	Asp	Ser	Tyr	Lys	Asn	Ala	Ser
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Met	Gln	Gly	Leu	Tyr	Ile	Phe	Ala	Asp	Met	Ala	Ser	Lys	Asp	Met
1265						1270					1275			
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1280						1285					1290			
Phe	Asp	Thr	Asn	Asn	Val	Arg	Arg	Val	Asn	Asn	Arg	Tyr	Ala	Glu
1295						1300					1305			
Asp	Tyr	Glu	Ile	Pro	Ser	Ser	Val	Ser	Ser	Arg	Lys	Asp	Tyr	Gly
1310						1315					1320			
Trp	Gly	Asp	Tyr	Tyr	Leu	Ser	Met	Val	Tyr	Asn	Gly	Asp	Ile	Pro
1325						1330					1335			
Thr	Ile	Asn	Tyr	Lys	Ala	Ala	Ser	Ser	Asp	Leu	Lys	Ile	Tyr	Ile
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1370						1375					1380			
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1385						1390					1395			
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Thr	Ser	Gly	Leu	Asn	Gln	Gly	Arg	Leu	Leu	Phe	His	Arg	Asp	Thr
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1430						1435					1440			
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Asp	Ser	Leu	Asn	Lys	Pro	Asp	Asp	Leu	Lys	Gln	Tyr	Ile	Phe	Met
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1475						1480					1485			
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1490						1495					1500			
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Val Asp Asn Asn Ser His Ile 1670	Ile Tyr Ser Gly Gln 1675	Leu Thr Asp 1680
Thr Asn Ile Asn Ile Thr 1685	Leu Phe Ile Pro Leu 1690	Asp Val Pro 1695
Leu Asn Gln Asp Tyr His 1700	Ala Lys Val Tyr Met 1705	Thr Phe Lys Lys 1710
Ser Pro Ser Asp Gly Thr 1715	Trp Trp Gly Pro His 1720	Phe Val Arg Asp 1725
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Phe Glu Ser Val Asn Val 1745	Leu Asn Asn Ile Ser 1750	Ser Glu Pro Met 1755
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Tyr Thr Pro Met Leu Val 1775	Ala Gln Arg Leu Leu 1780	His Glu Gln Asn 1785
Phe Asp Glu Ala Asn Arg 1790	Trp Leu Lys Tyr Val 1795	Trp Ser Pro Ser 1800
Gly Tyr Ile Val His Gly 1805	Gln Ile Gln Asn Tyr 1810	Gln Trp Asn Val 1815
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Ser Val Asp Pro Asp Ala 1835	Val Ala Gln His Asp 1840	Pro Met His Tyr 1845
Lys Val Ser Thr Phe Met 1850	Arg Thr Leu Asp Leu 1855	Leu Ile Ala Arg 1860
Gly Asp His Ala Tyr Arg 1865	Gln Leu Glu Arg Asp 1870	Thr Leu Asn Glu 1875
Ala Lys Met Trp Tyr Met 1880	Gln Ala Leu His Leu 1885	Leu Gly Asp Lys 1890
Pro Tyr Leu Pro Leu Ser 1895	Thr Thr Trp Ser Asp 1900	Pro Arg Leu Asp 1905
Arg Ala Ala Asp Ile Thr 1910	Thr Gln Asn Ala His 1915	Asp Ser Ala Ile 1920
Val Ala Leu Arg Gln Asn 1925	Ile Pro Thr Pro Ala 1930	Pro Leu Ser Leu 1935
Arg Ser Ala Asn Thr Leu 1940	Thr Asp Leu Phe Leu 1945	Pro Gln Ile Asn 1950
Glu Val Met Met Asn Tyr 1955	Trp Gln Thr Leu Ala 1960	Gln Arg Val Tyr 1965

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Pro	Ile	Tyr	Ala	Thr	Pro	Ala	Asp	Pro	Lys	Ala	Leu	Leu	Ser	Ala
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Met	Ser	Leu	Trp	Arg	Phe	Pro	His	Met	Leu	Glu	Asn	Ala	Arg	Gly
2015						2020					2025			
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2030						2035					2040			
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Lys	Ala	Gly	Ala	Gln	Ser	Arg	Phe	Asp	Ser	Tyr	Gly	Lys	Leu	Tyr
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Lys	Thr	Ser	Leu	Lys	Thr	Gln	Gln	Glu	Gln	Thr	Gln	Ser	Gln	Leu
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2240						2245					2250			
Leu	Arg	Gly	Arg	Leu	Ala	Ala	Ile	Tyr	Phe	Gln	Phe	Tyr	Asp	Leu
2255						2260					2265			

Ala Val	Ala Arg Cys Leu Met	Ala Glu Gln Ala Tyr	Arg Trp Glu
2270	2275	2280	
Leu Asn	Asp Asp Ser Ala Arg	Phe Ile Lys Pro Gly	Ala Trp Gln
2285	2290	2295	
Gly Thr	Tyr Ala Gly Leu Leu	Ala Gly Glu Thr Leu	Met Leu Ser
2300	2305	2310	
Leu Ala	Gln Met Glu Asp Ala	His Leu Lys Arg Asp	Lys Arg Ala
2315	2320	2325	
Leu Glu	Val Glu Arg Thr Val	Ser Leu Ala Glu Val	Tyr Ala Gly
2330	2335	2340	
Leu Pro	Lys Asp Asn Gly Pro	Phe Ser Leu Ala Gln	Glu Ile Asp
2345	2350	2355	
Lys Leu	Val Ser Gln Gly Ser	Gly Ser Ala Gly Ser	Gly Asn Asn
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Asn Leu	Ala Phe Gly Ala Gly	Thr Asp Thr Lys Thr	Ser Leu Gln
2375	2380	2385	
Ala Ser	Val Ser Phe Ala Asp	Leu Lys Ile Arg Glu	Asp Tyr Pro
2390	2395	2400	
Ala Ser	Leu Gly Lys Ile Arg	Arg Ile Lys Gln Ile	Ser Val Thr
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Leu Pro	Ala Leu Leu Gly Pro	Tyr Gln Asp Val Gln	Ala Ile Leu
2420	2425	2430	
Ser Tyr	Gly Asp Lys Ala Gly	Leu Ala Asn Gly Cys	Glu Ala Leu
2435	2440	2445	
Ala Val	Ser His Gly Met Asn	Asp Ser Gly Gln Phe	Gln Leu Asp
2450	2455	2460	
Phe Asn	Asp Gly Lys Phe Leu	Pro Phe Glu Gly Ile	Ala Ile Asp
2465	2470	2475	
Gln Gly	Thr Leu Thr Leu Ser	Phe Pro Asn Ala Ser	Met Pro Glu
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Gly Gly Gly Ala Ile Thr Gly Met Gly Glu Ala Leu Thr Pro Ala Gly	
20 25 30	
ccg gat ggt atg gcc gcc tta tcc ctg cca tta ccc att tcc gcc ggg	144
Pro Asp Gly Met Ala Ala Leu Ser Leu Pro Leu Pro Ile Ser Ala Gly	
35 40 45	
cgt ggt tac gca ccc tcg ctc act ctg aat tac aac agt gga acc ggt	192
Arg Gly Tyr Ala Pro Ser Leu Thr Leu Asn Tyr Asn Ser Gly Thr Gly	
50 55 60	
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Asn Ser Pro Phe Gly Leu Gly Trp Asp Cys Gly Val Met Ala Ile Arg	
65 70 75 80	
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Arg Arg Thr Ser Thr Gly Val Pro Asn Tyr Asp Glu Thr Asp Thr Phe	
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ctg ggg ccg gaa ggt gaa gtg ttg gtc gta gca tta aat gag gca ggt	336
Leu Gly Pro Glu Gly Glu Val Leu Val Val Ala Leu Asn Glu Ala Gly	
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Gln Ala Asp Ile Arg Ser Glu Ser Ser Leu Gln Gly Ile Asn Leu Gly	
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Ala Thr Phe Thr Val Thr Cys Tyr Arg Ser Arg Leu Glu Ser His Phe	
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Asn Arg Leu Glu Tyr Trp Gln Pro Gln Thr Thr Gly Ala Thr Asp Phe	
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Trp Leu Ile Tyr Ser Pro Asp Gly Gln Val His Leu Leu Gly Lys Asn	
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Pro Gln Ala Arg Ile Ser Asn Pro Leu Asn Val Asn Gln Thr Ala Gln	
180 185 190	
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Trp Leu Leu Glu Ala Ser Ile Ser Ser His Ser Glu Gln Ile Tyr Tyr	
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Gln Tyr Arg Ala Glu Asp Glu Ala Gly Cys Glu Thr Asp Glu Leu Ala	
210 215 220	
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Ala His Pro Ser Ala Thr Val Gln Arg Tyr Leu Gln Thr Val His Tyr	
225 230 235 240	
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gtt	tct	gtc	cgc	cgg	gta	ggc	cat	gag	gac	aac	aac	acg	gtt	acc	gcg	1104
Val	Ser	Val	Arg	Arg	Val	Gly	His	Glu	Asp	Asn	Asn	Thr	Val	Thr	Ala	
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Leu	Pro	Pro	Leu	Glu	Leu	Ala	Tyr	Gln	Pro	Phe	Glu	Pro	Glu	Gln	Thr	
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Tyr	Gln	Asp	Arg	Asn	Gly	Trp	Trp	Tyr	Arg	Ser	Ala	Gln	Arg	Gln	Ala	
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705				710					715						720					
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tggtg caa aca gaa acc gag gat gaa atc agc ggc aat aag tta gtg acc	2304
Trp Gln Thr Glu Thr Glu Asp Glu Ile Ser Gly Asn Lys Leu Val Thr	
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Thr Leu Arg Tyr Ala His Gly Ala Trp Asp Gly Arg Glu Arg Glu Phe	
770 775 780	
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Arg Gly Phe Gly Tyr Val Glu Gln Thr Asp Ser His Gln Leu Ala Gln	
785 790 795 800	
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Gly Asn Ala Pro Glu Arg Thr Pro Pro Ala Leu Thr Lys Ser Trp Tyr	
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Ala Thr Gly Leu Pro Ala Val Asp Asn Ala Leu Ser Ala Gly Tyr Trp	
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Arg Gly Asp Lys Gln Ala Phe Ala Gly Phe Thr Pro Arg Phe Thr Leu	
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Trp Lys Glu Gly Lys Asp Val Pro Leu Thr Pro Glu Asp Asp His Asn	
850 855 860	
cta tac tgg tta aac ccg gcg cta aaa ggt cag cca ctg cgt agt gaa	2640
Leu Tyr Trp Leu Asn Arg Ala Leu Lys Gly Gln Pro Leu Arg Ser Glu	
865 870 875 880	
ctc tac ggg ctg gat ggc agc gca cag caa cag atc ccc tat aca gtg	2688
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Glu Arg Ile Ile Ser Asp Pro Gln Cys Asn Gln Asp Ile Thr Leu Ser	
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Ser Asp Leu Phe Gly Gln Pro Leu Lys Gln Val Ser Val Gln Tyr Pro	
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Cys Ala Glu Asn Ser Leu Ile Ala Asp Asp Lys Pro Arg Glu Tyr	
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Ile Thr Pro Asp Glu Leu Pro Gly Ile Leu Thr Gln Ala Gly Tyr	
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Gln Gln Glu Pro Tyr Leu Phe Pro Arg Thr Gly Glu Asn Lys Val	
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Phe Trp Arg Pro Val Ala Gln Arg Asn Ser Leu Leu Thr Gly Lys	
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Ala Leu Val			
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Arg Gly Tyr Ala Pro Ser Leu Thr Leu Asn Tyr Asn Ser Gly Thr Gly	
50 55 60	
Asn Ser Pro Phe Gly Leu Gly Trp Asp Cys Gly Val Met Ala Ile Arg	
65 70 75 80	
Arg Arg Thr Ser Thr Gly Val Pro Asn Tyr Asp Glu Thr Asp Thr Phe	
85 90 95	
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Gln Ala Asp Ile Arg Ser Glu Ser Ser Leu Gln Gly Ile Asn Leu Gly	
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Ala Thr Phe Thr Val Thr Cys Tyr Arg Ser Arg Leu Glu Ser His Phe	
130 135 140	
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145 150 155 160	
Trp Leu Ile Tyr Ser Pro Asp Gly Gln Val His Leu Leu Gly Lys Asn	
165 170 175	
Pro Gln Ala Arg Ile Ser Asn Pro Leu Asn Val Asn Gln Thr Ala Gln	
180 185 190	
Trp Leu Leu Glu Ala Ser Ile Ser Ser His Ser Glu Gln Ile Tyr Tyr	
195 200 205	

Gln Tyr Arg Ala Glu Asp Glu Ala Gly Cys Glu Thr Asp Glu Leu Ala  
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 Val Ser Val Arg Arg Val Gly His Glu Asp Asn Asn Thr Val Thr Ala  
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 420 425 430  
 Gly Glu Glu Met Asn Ala Val Thr Trp Gly Lys Met Gln Leu Leu Pro  
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 His Ser Gln His Pro Asp Gly Ser Trp Thr Arg Phe Thr Pro Leu His  
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 Arg Leu Tyr Val Asn Asn Arg Asp Gly Phe Thr Glu Gly Arg Asp Val

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Lys Leu Val Ala Phe Ser Asp Val Leu Gly Ser Gly Gln Ala His Leu 565 570 575		
Val Glu Val Ser Ala Thr Gln Val Thr Cys Trp Pro Asn Leu Gly His 580 585 590		
Gly Arg Phe Gly Gln Pro Ile Val Leu Pro Gly Phe Ser Gln Ser Ala 595 600 605		
Ala Ser Phe Asn Pro Asp Arg Val His Leu Ala Asp Leu Asp Gly Ser 610 615 620		
Gly Pro Ala Asp Leu Ile Tyr Val His Ala Asp Arg Leu Asp Ile Phe 625 630 635 640		
Ser Asn Glu Ser Gly Asn Gly Phe Ala Lys Pro Phe Thr Leu Ser Phe 645 650 655		
Pro Asp Gly Leu Arg Phe Asp Asp Thr Cys Gln Leu Gln Val Ala Asp 660 665 670		
Val Gln Gly Leu Gly Val Val Ser Leu Ile Leu Ser Val Pro His Met 675 680 685		
Ala Pro His His Trp Arg Cys Asp Leu Thr Asn Ala Lys Pro Trp Leu 690 695 700		
Leu Ser Glu Thr Asn Asn Asn Met Gly Ala Asn His Thr Leu His Tyr 705 710 715 720		
Arg Ser Ser Val Gln Phe Trp Leu Asp Glu Lys Ala Ala Ala Leu Ala 725 730 735		
Thr Gly Gln Thr Pro Val Cys Tyr Leu Pro Phe Pro Val His Thr Leu 740 745 750		
Trp Gln Thr Glu Thr Glu Asp Glu Ile Ser Gly Asn Lys Leu Val Thr 755 760 765		
Thr Leu Arg Tyr Ala His Gly Ala Trp Asp Gly Arg Glu Arg Glu Phe 770 775 780		
Arg Gly Phe Gly Tyr Val Glu Gln Thr Asp Ser His Gln Leu Ala Gln 785 790 795 800		
Gly Asn Ala Pro Glu Arg Thr Pro Pro Ala Leu Thr Lys Ser Trp Tyr 805 810 815		
Ala Thr Gly Leu Pro Ala Val Asp Asn Ala Leu Ser Ala Gly Tyr Trp 820 825 830		
Arg Gly Asp Lys Gln Ala Phe Ala Gly Phe Thr Pro Arg Phe Thr Leu 835 840 845		
Trp Lys Glu Gly Lys Asp Val Pro Leu Thr Pro Glu Asp Asp His Asn 850 855 860		

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 Leu Tyr Gly Leu Asp Gly Ser Ala Gln Gln Gln Ile Pro Tyr Thr Val  
 885 890 895  
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 980 985 990  
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 1130 1135 1140  
 Phe Trp Arg Pro Val Ala Gln Arg Asn Ser Leu Leu Thr Gly Lys  
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 Met Thr Leu Lys Trp Asp Thr His Tyr Cys Val Ile Thr Gln Thr  
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Gln Asp	Ala Ala Gly Leu Thr	Val Ser Ala Asn Tyr	Asp Trp Arg
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Phe Leu	Thr Pro Thr Gln Leu	Thr Asp Ile Asn Asp	Asn Val His
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Trp Gly	Ile Glu Ser Gly Val	Ala Thr Gly Tyr Ser	Ser Ser Glu
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Glu Lys	Pro Phe Ser Pro Pro	Asn Asp Ile Asp Thr	Ala Ile Asn
1235		1240	1245
Leu Thr	Gly Pro Leu Pro Val	Ala Gln Cys Leu Val	Tyr Ala Pro
1250		1255	1260
Asp Ser	Trp Met Pro Leu Phe	Ser Gln Glu Thr Phe	Asn Thr Leu
1265		1270	1275
Thr Gln	Glu Glu Gln Glu Thr	Leu Arg Asp Ser Arg	Ile Ile Thr
1280		1285	1290
Glu Asp	Trp Arg Ile Cys Ala	Leu Thr Arg Arg Arg	Trp Leu Gln
1295		1300	1305
Ser Gln	Lys Ile Ser Thr Pro	Leu Val Lys Leu Leu	Thr Asn Ser
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Ile Gly	Leu Pro Pro His Asn	Leu Thr Leu Thr Thr	Asp Arg Tyr
1325		1330	1335
Asp Arg	Asp Ser Glu Gln Gln	Ile Arg Gln Gln Val	Ala Phe Ser
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Asp Gly	Phe Gly Arg Leu Leu	Gln Ala Ser Val Arg	His Glu Ala
1355		1360	1365
Gly Glu	Ala Trp Gln Arg Asn	Gln Asp Gly Ser Leu	Val Thr Lys
1370		1375	1380
Val Glu	Asn Thr Lys Thr Arg	Trp Ala Val Thr Gly	Arg Thr Glu
1385		1390	1395
Tyr Asp	Asn Lys Gly Gln Thr	Ile Arg Thr Tyr Gln	Pro Tyr Phe
1400		1405	1410
Leu Asn	Asp Trp Arg Tyr Val	Ser Asp Asp Ser Ala	Arg Lys Glu
1415		1420	1425
Ala Tyr	Ala Asp Thr His Ile	Tyr Asp Pro Ile Gly	Arg Glu Ile
1430		1435	1440
Arg Val	Ile Thr Ala Lys Gly	Trp Leu Arg Gln Ser	Gln Tyr Phe
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Pro Trp	Phe Thr Val Ser Glu	Asp Glu Asn Asp Thr	Ala Ala Asp
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Ala Leu	Val		



1475

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 Val Leu Asp Asn Arg Lys Leu Asn Val Arg Thr Leu Glu Tyr Leu Arg  
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 Thr Gln Ala Asp Glu Asn Ser Asp Glu Leu Ile Thr Phe Tyr Glu Phe  
 35 40 45  
 aat att ccg gga ttt cag gta aaa agc acc gat cct cgt aaa aat aaa 192  
 Asn Ile Pro Gly Phe Gln Val Lys Ser Thr Asp Pro Arg Lys Asn Lys  
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 Asp Ile Glu Ser Arg Pro Val Leu Ile Ile Asn Ala Thr Gly Val Arg  
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 Gln Asn His Arg Tyr Glu Asp Asn Thr Leu Pro Gly Arg Leu Leu Ala  
 115 120 125  
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Lys Leu Ser Ser Asp Val Tyr Ile Thr Gln Ser Asn Thr Asp Ala Thr	
210 215 220	
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Gly Ala Leu Leu Thr Gln Thr Asp Ala Lys Gly Asn Ile Gln Arg Leu	
225 230 235 240	
gcc tat gat gtg gcc ggg cag cta aaa ggg agt tgg tta aca ctc aaa	768
Ala Tyr Asp Val Ala Gly Gln Leu Lys Gly Ser Trp Leu Thr Leu Lys	
245 250 255	
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Gly Gln Ala Glu Gln Val Ile Ile Lys Ser Leu Thr Tyr Ser Ala Ala	
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Ser Tyr Glu Pro Glu Thr Gln Arg Leu Ile Gly Ile Thr Thr Arg Arg	
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Pro Ser Asp Ala Lys Val Leu Gln Asp Leu Arg Tyr Gln Tyr Asp Pro	
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Val Gly Asn Val Ile Asn Ile Arg Asn Asp Ala Glu Ala Thr Arg Phe	
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Tyr Asp Ser Asn Gly Met Arg Gln Leu Lys Val Ser Glu Gln Pro Thr	
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<211> 2504

<212> PRT

<213> Photorhabdus luminescens

<400> 8

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 Arg Glu Lys Thr Arg Gly Met Val Asn Trp Gly Glu Ala Lys Arg Ile  
 35 40 45  
 Tyr Glu Ile Ala Gln Ala Glu Gln Asp Arg Asn Leu Leu His Glu Lys  
 50 55 60  
 Arg Ile Phe Ala Tyr Ala Asn Pro Leu Leu Lys Asn Ala Val Arg Leu  
 65 70 75 80  
 Gly Thr Arg Gln Met Leu Gly Phe Ile Gln Gly Tyr Ser Asp Leu Phe  
 85 90 95  
 Gly Asn Arg Ala Asp Asn Tyr Ala Ala Pro Gly Ser Val Ala Ser Met  
 100 105 110  
 Phe Ser Pro Ala Ala Tyr Leu Thr Glu Leu Tyr Arg Glu Ala Lys Asn  
 115 120 125  
 Leu His Asp Ser Ser Ser Ile Tyr Tyr Leu Asp Lys Arg Arg Pro Asp  
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 Leu Ala Ser Leu Met Leu Ser Gln Lys Asn Met Asp Glu Glu Ile Ser  
 145 150 155 160  
 Thr Leu Ala Leu Ser Asn Glu Leu Cys Leu Ala Gly Ile Glu Thr Lys  
 165 170 175

Thr Gly Lys Ser Gln Asp Glu Val Met Asp Met Leu Ser Thr Tyr Arg  
 180 185 190  
 Leu Ser Gly Glu Thr Pro Tyr His His Ala Tyr Glu Thr Val Arg Glu  
 195 200 205  
 Ile Val His Glu Arg Asp Pro Gly Phe Arg His Leu Ser Gln Ala Pro  
 210 215 220  
 Ile Val Ala Ala Lys Leu Asp Pro Val Thr Leu Leu Gly Ile Ser Ser  
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 His Ile Ser Pro Glu Leu Tyr Asn Leu Leu Ile Glu Glu Ile Pro Glu  
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 Lys Asp Glu Ala Ala Leu Asp Thr Leu Tyr Lys Thr Asn Phe Gly Asp  
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 Ile Thr Thr Ala Gln Leu Met Ser Pro Ser Tyr Leu Ala Arg Tyr Tyr  
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 Gly Val Ser Pro Glu Asp Ile Ala Tyr Val Thr Thr Ser Leu Ser His  
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 Gly Lys Met Glu Val Val Arg Val Thr Arg Thr Pro Ser Asp Asn Tyr  
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 Tyr Leu Ile Lys Tyr Asn Leu Ser Asn Ser Phe Gly Leu Asp Asp Phe  
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 Arg Trp His Ser Gly Ser Tyr Asn Phe Ala Ala Ala Asn Phe Lys Ile  
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 Asp Gln Tyr Ser Pro Lys Ala Phe Leu Leu Lys Met Asn Lys Ala Ile  
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 Arg Leu Leu Lys Ala Thr Gly Leu Ser Phe Ala Thr Leu Glu Arg Ile  
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 Val Asp Ser Val Asn Ser Thr Lys Ser Ile Thr Val Glu Val Leu Asn  
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 Lys Val Tyr Arg Val Lys Phe Tyr Ile Asp Arg Tyr Gly Ile Ser Glu  
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 Glu Thr Ala Ala Ile Leu Ala Asn Ile Asn Ile Ser Gln Gln Ala Val

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Lys	Ala	Val	Leu	Lys	Arg	Ala	Phe	Gln	Val	Asn	Ala	Ser	Glu	Leu	Tyr
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Lys	Ile	Val	Glu	Thr	Leu	Leu	Trp	Ile	Thr	Gln	Trp	Leu	Lys	Thr	Gln
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Thr	Thr	Leu	Thr	Pro	Glu	Ile	Ser	Asn	Leu	Thr	Ala	Thr	Leu	Ser	Ser
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Ala	Tyr	Asp	Leu	Leu	Leu	Trp	Ile	Asp	Gln	Ile	Gln	Pro	Ala	Gln	Ile
				725					730					735	
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			740					745					750		
Lys	Val	Ile	Thr	Phe	Ala	Gln	Val	Leu	Ala	Gln	Leu	Ser	Leu	Ile	Tyr
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Arg	Arg	Ile	Gly	Leu	Ser	Glu	Thr	Glu	Leu	Ser	Leu	Ile	Val	Thr	Gln
	770					775					780				
Ser	Ser	Leu	Leu	Val	Ala	Gly	Lys	Ser	Ile	Leu	Asp	His	Gly	Leu	Leu
	785					790					795				800
Thr	Leu	Met	Ala	Leu	Glu	Gly	Phe	His	Thr	Trp	Val	Asn	Gly	Leu	Gly
			805						810					815	
Gln	His	Ala	Ser	Leu	Ile	Leu	Ala	Ala	Leu	Lys	Asp	Gly	Ala	Leu	Thr
			820					825					830		



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1175						1180					1185			
Thr	Pro	Phe	Thr	Phe	Asp	Val	Thr	Glu	Lys	Val	Lys	Asn	Tyr	Thr
1190						1195					1200			
Ser	Ser	Thr	Asp	Ala	Ala	Glu	Ser	Leu	Gly	Leu	Tyr	Cys	Thr	Gly
1205						1210					1215			
Tyr	Gln	Gly	Glu	Asp	Thr	Leu	Leu	Val	Met	Phe	Tyr	Ser	Met	Gln
1220						1225					1230			
Ser	Ser	Tyr	Ser	Ser	Tyr	Thr	Asp	Asn	Asn	Ala	Pro	Val	Thr	Gly
1235						1240					1245			
Leu	Tyr	Ile	Phe	Ala	Asp	Met	Ser	Ser	Asp	Asn	Met	Thr	Asn	Ala
1250						1255					1260			
Gln	Ala	Thr	Asn	Tyr	Trp	Asn	Asn	Ser	Tyr	Pro	Gln	Phe	Asp	Thr
1265						1270					1275			
Val	Met	Ala	Asp	Pro	Asp	Ser	Asp	Asn	Lys	Lys	Val	Ile	Thr	Arg
1280						1285					1290			
Arg	Val	Asn	Asn	Arg	Tyr	Ala	Glu	Asp	Tyr	Glu	Ile	Pro	Ser	Ser
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Ala	Glu	Asp	Leu	Arg	Leu	Ser	Thr	Asn	Met	Ala	Leu	Ser	Ile	Ile
1340						1345					1350			
His	Asn	Gly	Tyr	Ala	Gly	Thr	Arg	Arg	Ile	Gln	Cys	Asn	Leu	Met
1355						1360					1365			
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1370						1375					1380			
Ser	Phe	Asp	Asp	Ala	Asn	Arg	Phe	Asn	Leu	Val	Pro	Leu	Phe	Lys
1385						1390					1395			
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1430						1435					1440			
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Ile Ser Asn Pro Ile Asn Ile	Asn Thr Gly Ile Asp	Ser Ala Lys
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Val Lys Val Thr Val Lys Ala	Gly Gly Asp Asp Gln	Ile Phe Thr
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Ala Asp Asn Ser Thr Tyr Val	Pro Gln Gln Pro Ala	Pro Ser Phe
1505	1510	1515
Glu Glu Met Ile Tyr Gln Phe	Asn Asn Leu Thr Ile	Asp Cys Lys
1520	1525	1530
Asn Leu Asn Phe Ile Asp Asn	Gln Ala His Ile Glu	Ile Asp Phe
1535	1540	1545
Thr Ala Thr Ala Gln Asp Gly	Arg Phe Leu Gly Ala	Glu Thr Phe
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Ile Ile Pro Val Thr Lys Lys	Val Leu Gly Thr Glu	Asn Val Ile
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Ala Leu Tyr Ser Glu Asn Asn	Gly Val Gln Tyr Met	Gln Ile Gly
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Ala Tyr Arg Thr Arg Leu Asn	Thr Leu Phe Ala Gln	Gln Leu Val
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Ser Arg Ala Asn Arg Gly Ile	Asp Ala Val Leu Ser	Met Glu Thr
1610	1615	1620
Gln Asn Ile Gln Glu Pro Gln	Leu Gly Ala Gly Thr	Tyr Val Gln
1625	1630	1635
Leu Val Leu Asp Lys Tyr Asp	Glu Ser Ile His Gly	Thr Asn Lys
1640	1645	1650
Ser Phe Ala Ile Glu Tyr Val	Asp Ile Phe Lys Glu	Asn Asp Ser
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Phe Val Ile Tyr Gln Gly Glu	Leu Ser Glu Thr Ser	Gln Thr Val
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Val Lys Val Phe Leu Ser Tyr	Phe Ile Glu Ala Thr	Gly Asn Lys
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Asn His Leu Trp Val Arg Ala	Lys Tyr Gln Lys Glu	Thr Thr Asp
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Lys Ile Leu Phe Asp Arg Thr	Asp Glu Lys Asp Pro	His Gly Trp
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Phe Leu Ser Asp Asp His Lys	Thr Phe Ser Gly Leu	Ser Ser Ala
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Gln Ala Leu Lys Asn Asp Ser	Glu Pro Met Asp Phe	Ser Gly Ala
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Thr	Gln	Ala	Leu	Asn	Leu	Leu	Gly	Asp	Glu	Pro	Gln	Val	Met	Leu
1880						1885					1890			
Ser	Thr	Thr	Trp	Ala	Asn	Pro	Thr	Leu	Gly	Asn	Ala	Ala	Ser	Lys
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1925						1930					1935			
Thr	Ala	Leu	Phe	Leu	Pro	Gln	Glu	Asn	Ser	Lys	Leu	Lys	Gly	Tyr
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Ser	Ile	Asp	Gly	Gln	Pro	Leu	Ser	Leu	Pro	Leu	Tyr	Ala	Lys	Pro
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Leu Thr	Ser Ile Arg Met	Gln	Asp Asn Gln Leu	Ala	Glu Leu Asp
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Ser Glu	Lys Thr Ala Leu	Gln	Val Ser Leu Ala	Gly	Val Gln Gln
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Arg Phe	Asp Ser Tyr Ser	Gln	Leu Tyr Glu Glu	Asn	Ile Asn Ala
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Ser Gln	Gly Ala Gln Ile	Ser	Arg Met Ala Gly	Ala	Gly Val Asp
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Met Ala	Pro Asn Ile Phe	Gly	Leu Ala Asp Gly	Gly	Met His Tyr
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Gly Ala	Ile Ala Tyr Ala	Ile	Ala Asp Gly Ile	Glu	Leu Ser Ala
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Ser Ala	Lys Met Val Asp	Ala	Glu Lys Val Ala	Gln	Ser Glu Ile
2165		2170		2175	
Tyr Arg	Arg Arg Arg Gln	Glu	Trp Lys Ile Gln	Arg	Asp Asn Ala
2180		2185		2190	
Gln Ala	Glu Ile Asn Gln	Leu	Asn Ala Gln Leu	Glu	Ser Leu Ser
2195		2200		2205	
Ile Arg	Arg Glu Ala Ala	Glu	Met Gln Lys Glu	Tyr	Leu Lys Thr
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Gln Gln	Ala Gln Ala Gln	Ala	Gln Leu Thr Phe	Leu	Arg Ser Lys
2225		2230		2235	
Phe Ser	Asn Gln Ala Leu	Tyr	Ser Trp Leu Arg	Gly	Arg Leu Ser
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Gly Ile	Tyr Phe Gln Phe	Tyr	Asp Leu Ala Val	Ser	Arg Cys Leu
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Met Ala	Glu Gln Ser Tyr	Gln	Trp Glu Ala Asn	Asp	Asn Ser Ile
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Ser Phe	Val Lys Pro Gly	Ala	Trp Gln Gly Thr	Tyr	Ala Gly Leu
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Leu Cys	Gly Glu Ala Leu	Ile	Gln Asn Leu Ala	Gln	Met Glu Glu
2300		2305		2310	
Ala Tyr	Leu Lys Trp Glu	Ser	Arg Ala Leu Glu	Val	Glu Arg Thr
2315		2320		2325	
Val Ser	Leu Ala Val Val	Tyr	Asp Ser Leu Glu	Gly	Asn Asp Arg
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Gly Thr	Ala Gly Thr Lys	Glu	Asn Gly Leu Ser	Leu	Ala Asn Ala

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Lys	Gly	Cys	Ser	Ala	Leu	Ala	Val	Ser	His	Gly	Thr	Asn	Asp	Ser
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